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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Appeal to the Board of Patent Appeals and Interferences

In re PATENT application of
GASPAR

Group Art Unit: 2662

Application No. 09/725,088

Examiner: LEVITAN, Dmitry

Filed: November 29, 2000

Title: Arrangement for Verifying Randomness of TBEB Algorithm in a Media Access Controller

Docket : 95-379

Date: May 12, 2005

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1 [ ] **NOTICE OF APPEAL**: Applicant hereby appeals to the Board of Patent Appeals and Interferences from the decision (not Advisory Action) dated December 16, 2004 of the Examiner twice/finally rejecting claims 1-20

2 [X] **BRIEF** on appeal in this application attached in triplicate.

3 [ ] An **ORAL HEARING** is respectfully requested under Rule 194 (due two months after Examiner's Answer -- unextendable).

4 [ ] Reply Brief is attached in triplicate (due two months after Examiner's Answer -- unextendable).

5. **FEE CALCULATION:**		Large/Small Entity	
If box 1 above is X'd, see box 12 below first and decide: .... enter		$500/250*	$
If box 2 above is X'd, see box 12 below first and decide: .... enter		$500/250*	$500.00
If box 3 above is X'd, see box 12 below first and decide: .... enter		$1000/500*	$
If box 4 above is X'd, ... enter nothing		- 0 - (no fee)	
6. Original due date: May 16, 2005			
7. **Petition is hereby made** to extend the original due date to cover the date this response is filed for which the requisite fee is attached (1 mo) (2mos) (3mos) (4mos)	$120/$60 $450/$225 $1020/$510 $1590/$795	+	
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9. **Subtract line8 from line7 and enter: Total Extension Fee**			+500.00
10. **TOTAL FEE ATTACHED =**			**$ 500.00**

11. [ ] *Fee NOT required if/since paid in prior appeal in which the Board of Patent Appeals and Interferences did not render a decision on the merits.

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order No. 50-0687 / 95-379 for which purpose a duplicate copy of this sheet is attached. **This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed**

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Docket No.: 95-379 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	
GASPAR	
Serial No.: 09/725,088	Group Art Unit: 2662
Filed: November 29, 2000	Examiner: LEVITAN, Dmitry

For: ARRANGEMENT FOR VERIFYING RANDOMNESS OF TBEB ALGORITHM IN A MEDIA ACCESS CONTROLLER

MAIL STOP: APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

This is an appeal from the final rejection of claims 1-20 in the above-identified patent application.

This Appeal Brief is submitted in triplicate as required by 37 C.F.R. §1.192(a).

1. Real Party in Interest:

This application is assigned to Advanced Micro Devices, Inc., the real party of interest.

2. Related Appeals and Interferences:

There are no other appeals or interferences known to Appellant that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims:

Claims 1-20 are pending in this application. Claims 1-20 stand rejected by the Examiner. Claims 1-20 are appealed.

4. Status of any Amendment File Subsequent to Final Rejection:

No Amendment was filed in response to the Final Rejection. A Response to the Final Rejection was filed on January 27, 2005.

5. Summary of Invention:

The invention relates to a testing system (30 of Fig. 2, 60 of Fig. 3) for testing a device under test (32 of Fig. 2, 32' of Fig. 3) having a media access controller (34 of Figs. 2 and 3) configured for generating random numbers (step 20 of Fig. 1) for idle intervals.

The invention addresses the problem of testing devices having media access controllers (MAC) (34) to ensure the media access controllers perform collision mediation in accordance with the Truncated Binary Exponential (TBEB) Algorithm (Fig. 1). The TBEB algorithm requires that a MAC arbitrates with other MAC devices by randomly selecting an integer within a prescribed range (step 20 of Fig. 1) (page 1, line 23 to page 2, line 24): a MAC that tends to select a lower integer will tend to violate the TBEB algorithm by capturing the network medium from other MAC devices, and a MAC that tends to select a higher integer will be unable to successfully arbitrate with other MAC devices (page 3, lines 5-9). The invention solves this problem by enabling a test engineer to determine whether sufficiently random numbers are generated for collision mediation according to the IEEE 802.3 TBEB algorithm (page 3, lines 25-27).

Hence, the invention of claim 1 provides a method of testing a network device under test (32 of Fig. 2) having a media access controller (34 of Fig. 2) configured for generating random numbers (step 20 of Fig. 1) (page 1, line 23 to page 2, line 24) for idle intervals (step 22 of Fig. 1) in response to sensed collisions, respectively. The method includes attempting transmission, by the network device under test (32 of Fig. 2), of data packets onto a network medium (38a of

Fig. 2) (page 5, lines 20-21), and generating the collisions in response to each attempted transmission of the data packet (packet gen. 44 of Fig. 2 forces collisions, page 5, lines 20-27; loopback mode 64 of Fig. 3 automatically sensed as colliding packet, page 6, lines 25-34). The method also includes identifying time intervals that the network device under test is transmitting on the network medium relative to the idle intervals (logic analyzer 50 of Fig. 2 or 52 of Fig. 3 identifies intervals based on asserted CRS signal, page 5, lines 28-33, page 7, lines 1-6), and determining a randomness of the idle intervals based on a prescribed minimum number (i.e., a statistically significant number, page 6, lines 1-4) of the identified time intervals (Figs. 4A, 4B, and 4C illustrate random distribution, low distribution, and high distribution, respectively, page 4, lines 27-29 and page 6, lines 11-24).

The invention of claim 2 adds to the method of claim 1, wherein the step of generating the collisions includes connecting a physical layer transceiver (62 of Fig. 3), coupled to the network device under test (32' of Fig. 3), in a loopback mode (64 of Fig. 3) for simultaneous transmission and reception of each attempted transmission of the data packet (page 6, lines 25-34).

The invention of claim 3 adds to the method of claim 2, wherein the network device under test is coupled to a physical layer transceiver via an exposed media independent interface (48 of Fig. 3), the identifying step including detecting an asserted carrier sense signal (CRS of Fig. 3) on the exposed media independent interface by a connected logic analyzer (52 of Fig. 3), and storing the corresponding time interval for the asserted carrier sense signal (page 6, lines 25-34).

The invention of claim 4 adds to the method of claim 3, wherein the determining step includes correlating the idle intervals relative to the identified time intervals and based on a determined access attempt (Figs. 4A-4C illustrate correlating idle intervals based on access attempt equal to "3", page 4, lines 26-28, page 6, lines 7-13).

The invention of claim 5 adds to the method of claim 1, wherein the step of generating the collisions includes connecting to the network medium a packet generator (44 of Fig. 2) configured for outputting onto the network medium a colliding packet in response to detection of

each attempted transmission of the data packet (packet gen. 44 forces collisions, page 5, lines 15-27).

The invention of claim 6 adds to the method of claim 5, wherein the identifying step includes detecting, by a logic analyzer (50 of Fig. 2), an asserted carrier sense signal (CRS of Fig. 2) generated onto an exposed media independent interface (48 of Fig. 2) by a physical layer transceiver (46 of Fig. 2) connected to the network medium (38 of Fig. 2), the network analyzer storing the corresponding time interval for the asserted carrier sense signal (page 5, lines 9-14 and 28-33).

The invention of claim 7 adds to the method of claim 6, wherein the determining step includes correlating the idle intervals relative to the identified time intervals and based on a determined access attempt (Figs. 4A-4C illustrate correlating idle intervals based on the access attempt equal to "3", page 4, lines 26-28, page 6, lines 7-13).

The invention of claim 8 adds to the method of claim 6, wherein the physical layer transceiver (46 of Fig. 2) is coupled via the exposed media independent interface to a second media access controller (34' of Fig. 2) separate from the network device under test (32 of Fig. 2).

The invention of claim 9 adds to the method of claim 6, wherein the network device under test, the physical layer transceiver, and the packet generator are interconnected to the network medium via a hub (42 of Fig. 2) (page 5, lines 7-14).

The invention of claim 10 provides a testing system (30 of Fig. 2, 60 of Fig. 3) for testing a network device under test (32 of Fig. 2, 32' of Fig. 3) having a media access controller (34 of Figs. 2, 3) configured for generating random numbers (step 20 of Fig. 1) for idle intervals in response to sensed collisions, respectively. The testing system includes a collision generator configured for generating a collision in response to each attempted transmission of a data packet by the network device under test (packet gen. 44 of Fig. 2 forces collisions, page 5, lines 20-27; loopback mode 64 of Fig. 3 automatically sensed as colliding packet, page 6, lines 25-34). The testing system also includes an analyzer configured for identifying time intervals that the network device under test is transmitting on the network medium (logic analyzer 50 of Fig. 2 or 52 of Fig. 3 identifies intervals based on asserted CRS signal, page 5, lines 28-33, page 7, lines 1-6), the

analyzer determining a randomness of the idle intervals based on a prescribed minimum number (i.e., a statistically significant number, page 6, lines 1-4) of the identified time intervals (Figs. 4A, 4B, and 4C illustrate random distribution, low distribution, and high distribution, respectively, page 4, lines 27-29 and page 6, lines 1-24).

The invention of claim 11 adds to the system of claim 10, wherein the collision generator includes a physical layer transceiver (62 of Fig. 3) configured in a loopback mode (64 of Fig. 3) for identification of said each attempted transmission of the data packet as the corresponding collision (loopback mode 64 of Fig. 3 automatically sensed as colliding packet, page 6, lines 25-34).

The invention of claim 12 adds to the system of claim 11, wherein the physical layer transceiver (62 of Fig. 3) is coupled to the network device under test (32' of Fig. 3) via an exposed media independent interface (48 of Fig. 3), the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal (CRS of Fig. 3) on the exposed media independent interface (page 6, lines 25-34).

The invention of claim 13 adds to the system of claim 10, wherein the collision generator includes a packet generator (44 of Fig. 2), coupled to a network medium (38b of Fig. 2), configured for outputting onto the network medium a colliding packet in response to detection of said each attempted transmission of a data packet on the network medium (packet gen. 44 forces collisions, page 5, lines 15-27).

The invention of claim 14 adds to the system of claim 13 a physical layer transceiver (46 of Fig. 2) coupled to the network medium (38c of Fig. 2) and having an exposed media independent interface (48 of Fig. 2), the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal (CRS of Fig. 2) on the exposed media independent interface (page 5, lines 9-14 and 28-33).

The invention of claim 15 adds to the system of claim 14, wherein the physical layer transceiver (46 of Fig. 2) is coupled via the exposed media independent interface (48 of Fig. 2) to a second media access controller (34') separate from the network device under test.

The invention of claim 16 provides testing system (30 of Fig. 2, 60 of Fig. 3) for testing a

network device under test (32 of Fig. 2, 32' of Fig. 3) having a media access controller (34 of Figs. 2, 3) configured for generating random numbers (step 20 of Fig. 1) for idle intervals in response to sensed collisions, respectively. The testing system includes a collision generator configured for generating a collision in response to each attempted transmission of a data packet by the network device under test (packet gen. 44 of Fig. 2 forces collisions, page 5, lines 20-27; loopback mode 64 of Fig. 3 automatically sensed as colliding packet, page 6, lines 25-34). The testing system also includes an analyzer configured for identifying time intervals that the network device under test is transmitting on the network medium (logic analyzer 50 of Fig. 2 or 52 of Fig. 3 identifies intervals based on asserted CRS signal, page 5, lines 28-33, page 7, lines 1-6). The testing system also includes a processor (54 of Fig. 3) configured for determining a randomness of the idle intervals based on a prescribed minimum number (i.e., a statistically significant number, page 6, lines 1-4) of the identified time intervals (Figs. 4A, 4B, and 4C illustrate random distribution, low distribution, and high distribution, respectively, page 4, lines 27-29 and page 6, lines 1-24) (processor 54 determines randomness, page 7, lines 1-6).

The invention of claim 17 adds to the system of claim 16, wherein the collision generator includes a physical layer transceiver (62 of Fig. 3) configured in a loopback mode (64 of Fig. 3) for identification of said each attempted transmission of the data packet as the corresponding collision (loopback mode 64 of Fig. 3 automatically sensed as colliding packet, page 6, lines 25-34).

The invention of claim 18 adds to the system of 17, wherein the physical layer transceiver (62 of Fig. 3) is coupled to the network device under test (32' of Fig. 3) via an exposed media independent interface (48 of Fig. 3), the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal (CRS of Fig. 3) on the exposed media independent interface (page 6, lines 25-34).

The invention of claim 19 adds to the system of claim 16, wherein the collision generator includes a packet generator (44 of Fig. 2), coupled to a network medium (38b of Fig. 2), configured for outputting onto the network medium a colliding packet in response to detection of said each attempted transmission of a data packet on the network medium page 5, lines 15-27).

The invention of claim 20 adds to the system of claim 19 a physical layer transceiver (46 of Fig. 2) coupled to the network medium (38c of Fig. 2) and having an exposed media independent interface (48 of Fig. 2), the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal (CRS) on the exposed media independent interface (page 5, lines 9-14 and 28-33).

6. Issues:

A. Whether claims 1, 10, and 16 are enabled by the specification under 35 U.S.C. §112, first paragraph.

B. Whether claims 2, 11, and 17 are enabled by the specification under 35 U.S.C. §112, first paragraph.

C. Whether claims 3, 6, 8, 12, 14-15, 18 and 20 are enabled by the specification under 35 U.S.C. §112, first paragraph.

D. Whether claims 1-20 satisfy the requirements of 35 U.S.C. §112, second paragraph.

7. Grouping of Claims:

With regard to the rejections, claims 1, 5, 10, 13, 16 and 19 stand or fall together; claims 2, 11, and 17 stand or fall together; and claims 3-4, 6-9, 12, 14-15, 18 and 20 stand or fall together.

8. Arguments:

A. **Claims 1, 10, and 16 are enabled by the specification under 35 U.S.C. §112, first paragraph.**

In the Final Office Action, the Examiner rejected independent claims 1, 10, and 16 under 35 U.S.C. §112, first paragraph, alleging that the specification does not provide sufficient details to enable one skilled in the art to make and use the invention because it does not adequately describe the claimed "determin[ing] a randomness of the idle intervals based on the prescribed

minimum number of the identified time intervals." (See Page 2 of Final Action). Specifically, the Examiner asserted on Page 3 that:

> Fig. 4A-C and specification [sic] description of low distribution on Fig. 4B and high distribution on Fig. 4C are not sufficient to determine randomness of the intervals, because these figures provide ***no criteria on randomness***. Examiner ***believes*** it is impossible to compare the measurement results to the Fig. 4A-C and determine if the results are random.

(Emphasis added).

The Examiner also asserted in the Advisory action that:

> Examiner believes that the step of "determining a randomness" is not described ... to enable one skilled in the art to make and use the invention. Pictures 4A-C are not adequate to ***quantify randomness*** of the idle intervals, because ***the examples with high and low biases have no quantitative values***.

(Emphasis added).

Hence, the Examiner's position is that randomness cannot be determined without explicit quantitative values that specifically define randomness. As described below, the Examiner's position is both factually and legally flawed.

The law is well settled that the scope of enablement by the specification must only bear a <u>reasonable correlation</u> to the scope of the claims, and that trivial details need not be described. As stated in §2164.08 of the MPEP (page 197, Rev. 2, May 2004):

> The Federal Circuit has repeatedly held that "the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without `undue experimentation'." *In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993). Nevertheless, not everything necessary to practice the invention need be disclosed. In fact, ***what is well-known is best omitted***. *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991). All that is necessary is that one skilled in the art be able to practice the claimed invention, given the level of knowledge and skill in the art. Further the scope of enablement must only bear a "reasonable correlation" to the scope of the claims. See, e.g., *In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970).

(Emphasis added).

Further, the Examiner bears the burden of explaining why any assertions of enablement in the specification are deficient:

> When rejecting a claim under the enablement requirement of § 112, the PTO bears an initial burden of setting forth a reasonable explanation as to why it believes that the scope of protection provided by the claim is not adequately enabled by the description of the invention provided in the specification of the application; this includes, of course, ***providing sufficient reasons for doubting any assertions in the specification as to the scope of enablement.***
>
> *In re Wright*, 27 USPQ 2d 1510, 1513 (Fed. Cir. 1993) (emphasis added).

Finally, the Examiner bears the burden of explaining why the specification would require undue experimentation on the part of one skilled in the art. *See In re Angstadt*, 190 USPQ 214, 219 (C.C.P.A. 1976) ("We note that the PTO has the burden of giving reasons, supported by the record as a whole, why the specification is not enabling. . . . Showing that the disclosure entails undue experimentation is part of the PTO's initial burden.").

Hence, the Examiner bears the burden of explaining (1) why the specification does not bear not even a reasonable correlation to the scope of the claims; (2) why any assertions of enablement in the specification are deficient; and (3) why one skilled in the art would require ***undue experimentation*** to make and use the invention.

In the subject application, the Examiner has failed to provide any explanation as to why the specification does not even provide a reasonable correlation to the scope of the claims. Rather, the Examiner simply dismisses the teachings of Figures 4A-4C with the "belief" that "it is impossible to compare the measurement results to the Fig. 4A-C and determine if the results are random" because they are "not adequate to quantify randomness" based on "the examples with high and low biases have not quantitative values."

First and foremost, the Examiner's beliefs are irrelevant: what is at issue is the knowledge of a person of ordinary skill in the art.

The definition of "random" is notoriously well known in the art. Webster's New World Dictionary (3d. College Ed.) defines "random" on page 1112 as "of statistical sample selection in

which all possible samples have equal probability of selection". A copy of this definition, originally provided in the January 27, 2005 Response After Final as Exhibit 1 is attached as an Appendix to this Brief.

Hence, one skilled in the art would interpret the phrase "determining a randomness" as whether all possible samples have an equal probability of selection. As described below, the specific parameters used to "determine a randomness", where: (1) all possible samples ***do*** have an equal probability of selection, or (2) all possible samples ***do not*** have an equal probability of selection, is based on one skilled in the art applying reasonable experimentation in view of the specification in implementing the claim as a whole.

Each of the independent claims 1, 10, and 16 specify testing "***a network device under test*** having a media access controller ***configured for generating random numbers for idle intervals*** in response ***to sensed collisions***". Hence, each of the claims explicitly specify that the testing includes "determining a randomness of the idle intervals" having been generated by the media access controller.

The specification provides explicit details regarding the required generation of random numbers in response to sensed collisions as a necessary component of the collision mediation according to the TBEB algorithm in IEEE 802.3 half duplex networks. For example, the specification describes on page 2, lines 1-9:

> The station computes a collision backoff interval as a randomized integer multiple of a slot time interval, and attempts retransmission after the collision backoff interval. The station will attempt to transmit under the truncated binary exponential algorithm a maximum of sixteen times.
>
> The collision backoff interval is calculated by selecting a random number of slot times from the range of zero to $2^j - 1$. For example, if the number of attempts j=3, then the range of randomly selected number of slot times is [0,7]; if the randomly-selected number of slot times is four, then the collision backoff interval will be equal to four slot time intervals. According to Ethernet protocol, the maximum range of randomly selected slot times is $2^{10} - 1$.

The requirement for randomly selecting a slot time in response to a sensed collision also

is well known, as demonstrated by the prior art of record (see, e.g., USP 6,141,327 at col. 1, lines 35-40 and USP 5,936,962 at col. 2, lines 25-28).

The specification then describes the need for testing devices to ensure that they do not unfairly capture the network medium, or fail to successfully arbitrate with other devices during collision mediation, due to not satisfying the requirement of selecting the slot times *randomly*. As described on page 3, lines 1-9 of the specification:

> However, operational testing of network devices having a media access controller may be insufficient for adequately testing the randomness of the TBEB algorithm implemented within the media access controller. In particular, conventional testing schemes of connecting a network device under test to a network emulator are incapable of determining whether the MAC within the device under test provides a reliable random selection of slot times, as required under IEEE 802.3; hence, an insufficiently tested network device that is deployed in a network may over time develop a bias for selecting lower numbers of slot times (and unfairly capture the medium), or a bias for selecting high numbers of slot times (resulting in a relative inability to successfully arbitrate with other devices during collision mediation).

The specification specifies on page 3, lines 12-13 that "[t]here is a need for an arrangement that ensures that a network device under test reliably complies with the randomness requirements of the IEEE 802.3 TBEB algorithm". The specification then describes at page 3, lines 25-27 that "the identified time intervals can be used to determine whether sufficiently random numbers are generated for *collision mediation* according to the IEEE 802.3 TBEB algorithm."

Hence, one of ordinary skill in the art would recognize that the claimed recitation of "determining a randomness of the idle intervals", when properly construed *in view of the specification*, simply requires determining whether the idle intervals that are generated by the media access controller have an equal probability of selection to ensure fairness for collision mediation.

Simply put, one skilled in the art would realize that the goal of the testing is to determine whether the collision mediation performed by the media access controller in the network device under test is either: (1) fair (based on equal probability of selection); or (2) unfair (based on ***unequal probability of selection***).

Hence, the claimed "determining a randomness of the idle intervals" simply classifies the idle intervals as "not random" (due to a bias for selecting higher or lower numbers), or "random" (due to neither a bias for selecting higher numbers nor a bias for selecting lower numbers).

The specification provides <u>explicit information</u> on <u>how</u> to classify a "prescribed minimum number of the identified time intervals" relative to randomness. The specification first describes the "prescribed minimum number of the identified time intervals" on page 6, line 2 as "a statistically significant number of identified time intervals". Further, the specification describes with respect to Figs. 4A-4C that the distribution of slot times enables an engineer to distinguish between: (1) idle intervals that exhibit a bias for selecting <u>lower numbers</u> of slot times *during collision mediation* (resulting in unfairly capturing the medium); (2) idle intervals that exhibit a bias for selecting <u>higher numbers</u> of slot times *during collision mediation* (resulting in an inability to arbitrate for the medium); and (3) idle intervals that <u>neither</u> exhibit a bias for selecting lower numbers of slot times nor a bias for selecting higher numbers *during collision mediation* (resulting in fair arbitration according to the TBEB algorithm):

> Figures 4A, 4B, and 4C are diagrams illustrating a determined distribution of slot times for the collision delay intervals selected by the MAC 34 over time during collision mediation when the number of access attempts equals 3. Figure 4A illustrates a random distribution, whereas Figures 4B and 4C illustrate a low distribution and a high distribution, respectively. Hence, *if the logic analyzer determines that the MAC 34 selects slot times resembling the distribution of Figure 4A,* ***then an engineer can determine that the MAC 34 is compliant with the randomness requirements of the TBEB algorithm***.
>
> (Page 6, lines 11-16).

The specification provides *additional details* describing how Fig. 4B illustrates generation of numbers by a random number generator that is overly aggressive due to a tendency to select lower numbers (unequal probability of selection), causing the network medium to be unfairly captured, and how Fig. 4C illustrates generation of numbers by a random number generator that tends to lose collision mediation due to the tendency to select higher numbers (unequal probability of selection). (See, e.g., page 6, lines 17-24).

The specification also concludes that "a test engineer can validate whether the MAC 34 complies with the TBEB algorithm specified by the IEEE 802.3 protocol based on evaluating the determined distribution of slot times." (See, e.g., page 6, lines 22-24 and page 7, lines 7-10).

As apparent from the foregoing, the specification provides more than a "reasonable correlation" to the "determining a randomness of the idle intervals" generated by the media access controller according to the scope of the claims, and provides examples of: (1) a random distribution that allows an engineer to determine that the MAC 34 is compliant with the randomness requirements of the TBEB algorithm (Fig. 4A); (2) a low distribution based on the MAC tending to select too low a number of slot times for the collision delay interval, resulting in non-compliance with the randomness requirements of the TBEB algorithm (Fig. 4B); and (3) a high distribution based on the MAC tending to select too high a number of slot times for the collision delay interval, resulting in non-compliance with the randomness requirements of the TBEB algorithm due to the tendency to lose collision mediation (Fig. 4C).

Hence, the specification provides more than a reasonable correlation to the claimed testing of the media access controller based on determining of a randomness of the idle intervals generated in response to sensed collisions. For this reason alone the rejections should be reversed.

Further, the Examiner fails to identify why the assertions of enablement in the specification are deficient. The Examiner simply criticizes the Figures 4A-C as not having any "quantitative values."

However, the Examiner fails to address the assertions in the specification that "if the logic analyzer determines that the MAC 34 selects slot times resembling the distribution of Figure 4A, ***then an engineer can determine that the MAC 34 is compliant with the randomness requirements of the TBEB algorithm***" (page 6, lines 14-16) or "***a test engineer can validate whether the MAC 34 complies with the TBEB algorithm specified by the IEEE 802.3 protocol based on evaluating the determined distribution of slot times***" (page 6, lines 23-25).

The Examiner ignores the explicit statements in the specification that one skilled in the art (e.g., a test engineer) can determine whether the MAC is compliant with the randomness

requirements based on the determined distribution of slot times, where the "randomness requirements" correlates to the claimed "determining a randomness of the idle intervals.

Further, the Examiner's"belief" that randomness cannot be quantified without the specification providing **quantitative values** demonstrates a deliberate refusal to allow a person of ordinary skill in the art any discretion to employ ***reasonable experimentation*** to select the most appropriate quantitative values to determine whether a given pattern should be determined to be "random" (e.g., deemed compliant with the TBEB algorithm according to IEEE 802.3 protocol). For example a manufacturing engineer may collect a larger number of samples and employ more stringent parameters to ensure long-term reliability of the random number generator in the device under test, whereas a field test engineer (or network administrator) may collect fewer samples and employ less stringent parameters for brief troubleshooting or validation procedures. Hence, one skilled in the art could apply different "quantitative values" depending on how the testing is implemented.

Further, statistics is a notoriously well-known discipline that does not need to be added to the subject specification.

Hence, the Examiner's requirement of explicit quantitative values to define whether a statistically significant number of samples should be deemed random (i.e., "of statistical sample selection in which all possible samples have equal probability of selection") is both legally improper and absurd. "[T]he law does not require a specification to be a blueprint in order to satisfy the requirement for enablement under 35 USC 112, first paragraph." *Staehelin v. Secher*, 24 USPQ 2d 1513, 1516 (USPTO Bd. Pat. App. Int. 1992) (*quoting In re Gay*, 135 USPQ 311, 316 (CCPA 1962)("Not every last detail is to be described, else patent specifications would turn into production specifications, which they were never intended to be.").

For these and other reasons, the rejection of claims 1, 10, and 16 under §112, first paragraph should be withdrawn.

B. Claims 2, 11, and 17 are enabled by the specification under 35 U.S.C. §112, first paragraph

In the Final Office Action, the Examiner rejected claims 2, 11, and 17 under §112, first paragraph, alleging that the specification does not provide sufficient details to enable one skilled in the art to make and use the invention because it does not adequately describe "how a physical transceiver operates in a loop back mode."

As described above, the specification only needs a "reasonalbe correlation" to the scope of the claims, such that trivial details need not be described. (See MPEP §2164.08 *supra* at page 8).

The "loopback mode" is described, for example, at page 6, line 30 et seq. of the specification:

> The physical layer transceiver 62 is configured in a loopback mode for simultaneous transmission and reception of each attempted transmission of the data packet. Hence, each data packet transmitted by the PHY 62 onto the loopback medium 64 is ***automatically sensed as a colliding data packet***, causing the MAC 34 to halt transmission and begin collision mediation.

Hence, loopback simply means that the transmitting line is connected to the receiving line, demonstrated by reference numeral 64 in Figure 3. The Examiner fails to identify how this description in the specification is in any way deficient. The Examiner's "beliefs" are irrelevant.

Further, the Examiner fails to explain why the specification would require undue experimentation (*Cf. In re Angstadt, supra*). One having ordinary skill in the art would consider the implementation of a loopback mode a trivial issue of simply connecting the receive line and transmit line *together*. Collision detection is notoriously well known in the art.

There is no rational basis presented by the Examiner that one skilled in the art would suffer undue experimentation to implement loopback.

For these and other reasons, the rejections of claims 2, 11, and 17 should be reversed.

C. Claims 3, 6, 8, 12, 14-15, 18 and 20 are enabled by the specification under 35 U.S.C. §112, first paragraph

Claims 3, 6, 8, 12, 14-15, 18 and 20 recite "exposed media independent interface". The Examiner rejected claims "3, 6, 8, 12, 15, and 18" on the basis of "what is [an] exposed media independent interface". The Examiner further asserted that he "***believes*** that exposed media independent interface is not well known in the art and the specification does not provide enough details about the structure and operation of it to enable one skilled in the art to make and use the invention without undue experimentation."

This argument is ***precisely*** why both the courts and the Board have repeatedly admonished Examiners that "[T]he law does not require a specification to be a blueprint in order to satisfy the requirement for enablement under 35 USC 112, first paragraph." *Staehelin v. Secher*, 24 USPQ 2d 1513, 1516 (USPTO Bd. Pat. App. Int. 1992).

The Examiner's assertion demonstrates a remarkable disregard for the explicit description in the specification. The "exposed media independent interface" simply refers to the fact that the MII 48 is available for connection of a logic analyzer probe:

> The physical layer transceiver 46 has an exposed media independent interface 48, enabling connection of a logic analyzer 50 to selected lines of the exposed MII 48. In particular, the logic analyzer 50 is configured for detecting a carrier sense signal (CRS) on the exposed MII 48 generated by the PHY 46 based on detected activity on the network medium 38.
>
> (Page 5, lines 9-13)
>
> The illustrated system 60 is usable if the MAC under test 34 has an exposed MII 48 that can be used by the logic analyzer 52 for monitoring the assertion of a carrier sense signal (CRS).
>
> (Page 6, lines 27-28).

The Official Action fails to identify how this description in the specification is in any way deficient.

Further, the Official Action fails to recognize that one skilled in the art would conclude

that an "exposed" MII that "enables connection of a logic analyzer 50 to selected lines of the exposed MII" is simply an MII that has ***signal lines that can be connected to a logic analyzer***. An example of an MII that is not exposed would be the disclosed device under test 32 of Fig. 2, because both the MAC 34 and the PHY 36 are integrated (and therefore packaged) on a single chip that renders the interface between the MAC 34 and the PHY 36 inaccessible:

> [An] integrated ***(i.e., single chip)*** network test device 32 ... includes a media access controller (MAC) 34 configured for sending and receiving data packets according to IEEE 802.3 half duplex protocol, ***and*** a physical layer transceiver (PHY) 36 configured for transmitting and receiving analog-based network signals carrying the data packets on a network medium 38a.

As stressed above, the Examiner fails to demonstrate how it would require ***undue experimentation*** for one skilled in the art to: (1) connect a MAC to a PHY using exposed connections (e.g., wires); and (2) connect a logic analyzer to one of the exposed connections to detect a carrier sense signal. Any assertion that it would be undue experimentation for an engineer to connect devices using exposed wires is absurd.

For these and other reasons, the rejection of claims "3, 6, 8, 12, 15, and 18" should be reversed.

D. Claims 1-20 satsify 35 U.S.C. §112, second paragraph.

The Examiner rejected all the claims 1-20, asserting that the recital of "determine a randomness of the idle intervals" was unclear, because the specification does not disclose what the determination of randomness means.

"In rejecting a claim under the second paragraph of 35 USC 112, it is incumbent on the examiner to establish that one of ordinary skill in the pertinent art, when reading the claims in light of the supporting specification, would not have been able to ascertain with a reasonable degree of precision and particularity the particular area set out and circumscribed by the claims." *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. Int. 1989) (*citing In re Moore*, 169 USPQ 236 (CCPA 1971).

The Examiner has provided no rational basis for rejecting the claims under §112, second

paragraph. As demonstrated above, one skilled in the art would have no difficulty whatsoever in ascertaining the scope of the claims: testing the network device under test (having a media access controller configured for ***generating random numbers for idle intervals***) based on determining whether the network device under test has generated idle intervals that are ***sufficiently random to ensure fairness for collision mediation***.

The scope of the claims are sufficiently precise that one skilled in the art could readily ascertain the scope of the invention. For these and other reasons, the rejection under §112, second paragraph should be reversed.

Conclusion

For the reasons set forth above, it is clear that Appellant's claims 1-20 comply with 35 U.S.C. §112, first and second paragraphs. It is respectfully requested that this appeal be granted and that the Examiner's rejections be reversed.

To the extent necessary, Appellant petitions for an extension of time under 37 C.F.R. 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including any missing or insufficient fees under 37 C.F.R. 1.17(a), to Deposit Account No. 50-0687, under Order No. 95-379, and please credit any excess fees to such deposit account.

Respectfully submitted,

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May 12, 2005

Attached: Exhibit 1 from Response After Final filed January 27, 2005 (2 pages)

APPENDIX – CLAIMS ON APPEAL

1. (ORIGINAL) A method of testing a network device under test having a media access controller configured for generating random numbers for idle intervals in response to sensed collisions, respectively, the method comprising:

attempting transmission, by the network device under test, of data packets onto a network medium;

generating the collisions in response to each attempted transmission of the data packet;

identifying time intervals that the network device under test is transmitting on the network medium relative to the idle intervals; and

determining a randomness of the idle intervals based on a prescribed minimum number of the identified time intervals.

2. (ORIGINAL) The method of claim 1, wherein the step of generating the collisions includes connecting a physical layer transceiver, coupled to the network device under test, in a loopback mode for simultaneous transmission and reception of each attempted transmission of the data packet.

3. (ORIGINAL) The method of claim 2, wherein the network device under test is coupled to a physical layer transceiver via an exposed media independent interface, the identifying step including detecting an asserted carrier sense signal on the exposed media

independent interface by a connected logic analyzer, and storing the corresponding time interval for the asserted carrier sense signal.

4. (ORIGINAL) The method of claim 3, wherein the determining step includes correlating the idle intervals relative to the identified time intervals and based on a determined access attempt.

5. (ORIGINAL) The method of claim 1, wherein the step of generating the collisions includes connecting to the network medium a packet generator configured for outputting onto the network medium a colliding packet in response to detection of each attempted transmission of the data packet.

6. (ORIGINAL) The method of claim 5, wherein the identifying step includes detecting, by a logic analyzer, an asserted carrier sense signal generated onto an exposed media independent interface by a physical layer transceiver connected to the network medium, the network analyzer storing the corresponding time interval for the asserted carrier sense signal.

7. (ORIGINAL) The method of claim 6, wherein the determining step includes correlating the idle intervals relative to the identified time intervals and based on a determined access attempt.

8. (ORIGINAL) The method of claim 6, wherein the physical layer transceiver is coupled via the exposed media independent interface to a second media access controller separate from the network device under test.

9. (ORIGINAL) The method of claim 6, wherein the network device under test, the physical layer transceiver, and the packet generator are interconnected to the network medium via a hub.

10. (ORIGINAL) A testing system for testing a network device under test having a media access controller configured for generating random numbers for idle intervals in response to sensed collisions, respectively, the testing system comprising:

a collision generator configured for generating a collision in response to each attempted transmission of a data packet by the network device under test; and

an analyzer configured for identifying time intervals that the network device under test is transmitting on the network medium, the analyzer determining a randomness of the idle intervals based on a prescribed minimum number of the identified time intervals.

11. (ORIGINAL) The system of claim 10, wherein the collision generator includes a physical layer transceiver configured in a loopback mode for identification of said each attempted transmission of the data packet as the corresponding collision.

12. (ORIGINAL) The system of claim 11, wherein the physical layer transceiver is coupled to the network device under test via an exposed media independent interface, the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal on the exposed media independent interface.

13. (ORIGINAL) The system of claim 10, wherein the collision generator includes a packet generator, coupled to a network medium, configured for outputting onto the network medium a colliding packet in response to detection of said each attempted transmission of a data packet on the network medium.

14. (ORIGINAL) The system of claim 13, further comprising a physical layer transceiver coupled to the network medium and having an exposed media independent interface, the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal on the exposed media independent interface.

15. (ORIGINAL) The system of claim 14, wherein the physical layer transceiver is coupled via the exposed media independent interface to a second media access controller separate from the network device under test.

16. (ORIGINAL) A testing system for testing a network device under test having a media access controller configured for generating random numbers for idle intervals in response to sensed collisions, respectively, the testing system comprising:

a collision generator configured for generating a collision in response to each attempted transmission of a data packet by the network device under test;

an analyzer configured for identifying time intervals that the network device under test is transmitting on the network medium; and

a processor configured for determining a randomness of the idle intervals based on a prescribed minimum number of the identified time intervals.

17. (ORIGINAL) The system of claim 16, wherein the collision generator includes a physical layer transceiver configured in a loopback mode for identification of said each attempted transmission of the data packet as the corresponding collision.

18. (ORIGINAL) The system of claim 17, wherein the physical layer transceiver is coupled to the network device under test via an exposed media independent interface, the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal on the exposed media independent interface.

19. (ORIGINAL) The system of claim 16, wherein the collision generator includes a packet generator, coupled to a network medium, configured for outputting onto the network

medium a colliding packet in response to detection of said each attempted transmission of a data packet on the network medium.

20. (ORIGINAL) The system of claim 19, further comprising a physical layer transceiver coupled to the network medium and having an exposed media independent interface, the analyzer configured for identifying the time intervals based on detecting an asserted carrier sense signal on the exposed media independent interface.

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in which all the rooms are on one floor, usually with a garage attached

Ran·chi (rän′chē) city in S Bihar, NE India: pop. 500,000

☆**ranch·man** (ranch′mən) *n., pl.* **-men** (-mən) a person who owns or works on a ranch

☆**ran·cho** (ran′chō, rän′-) *n., pl.* **-chos** [AmSp, small farm < Sp, small farm, group who eat together, mess < *ranchear*, to build huts < Fr (*se*) *ranger*, to make room < *ranger*: see RANGE] **1** a hut or group of huts for ranch workers **2** RANCH

Ran·cho Cu·ca·mon·ga (ran′chō ko͞o′kə mäŋ′gə) [< prec. + Shoshonean *kukamonga*, sandy place] city in S Calif., near San Bernardino: pop. 101,000

ran·cid (ran′sid) *adj.* [L *rancidus* < *rancere*, to be rank] **1** having the bad smell or taste of stale fats or oils; spoiled **2** repugnant — **ran·cid′i·ty** (-sid′ə tē) or **ran′cid·ness** *n.* —**ran′cid·ly** *adv.*

ran·cor (raŋ′kər) *n.* [ME *rancour* < OFr *rancor* < LL, rankness, in LL(Ec), rancor < L *rancere*, to be rank] a continuing and bitter hate or ill will; deep spite or malice: Brit., etc. sp. **ran′cour** —**ran′cor·ous** *adj.* —**ran′cor·ous·ly** *adv.*

rand[1] (rand) *n.* [ME *rande*, border, strip < OE *rand, rond*, brink, shield, akin to ON *rönd*, shield rim, OHG *rant*, shield boss < IE base **rem-*, to support > RIM] **1** [Brit.] an edge, border, or margin, as the unplowed strip around a field **2** a leather strip attached to the back of a shoe sole to level it before the heel is put on

rand[2] (rand, ränd, ränt) *n., pl.* **rand** [Afrik, orig., shield < Du, akin to OE *rand*: see prec.] the basic monetary unit of South Africa: see MONEY, table

Rand (rand), **the** WITWATERSRAND

Ran·dal or **Ran·dall** (ran′dəl) [< OE *Randwulf* (or ON *Ranthulfr*) < *rand*, shield (see RAND[1]) + *wulf*, WOLF] a masculine name

R & B or **r & b** rhythm and blues

R & D research and development

Ran·ders (rän′ərs) seaport in NE Jutland, Denmark: pop. 61,000

Ran·dolph (ran′dôlf′) [ML *Randulfus* < OE *Randwulf*: see RANDAL] **1** a masculine name **2 John** 1773-1833; U.S. statesman & orator

ran·dom (ran′dəm) *n.* [ME *randoun* < OFr *randon*, violence, speed (in *a randon*, violently) < *randir*, to run violently < Frank **rant*, a running, akin to OHG *rinnan*, to RUN] impetuous and haphazard movement: now only in **at random**, without careful choice, aim, plan, etc.; haphazardly —*adj.* **1** lacking aim or method; purposeless; haphazard **2** not uniform; esp., of different sizes: said of stones, etc. in certain types of masonry **3** *Statistics* of statistical sample selection in which all possible samples have equal probability of selection — **ran′dom·ly** *adv.* —**ran′dom·ness** *n.*

SYN.—**random** applies to that which occurs or is done without careful choice, aim, plan, etc. [*a random remark*]; **haphazard** applies to that which is done, made, or said without regard for its consequences, relevance, etc. and therefore stresses the implication of accident or chance [*a haphazard selection of books*]; **casual** implies a happening or seeming to happen by chance without intention or purpose and often connotes nonchalance, indifference, etc. [*a casual acquaintance*]; **desultory** suggests a lack of method or system, as in jumping from one thing to another [*his desultory reading in the textbook*]; **chance** emphasizes accidental occurrence without prearrangement or planning [*a chance encounter*] —*ANT.* **deliberate**

☆**ran·dom-ac·cess** (ran′dəm ak′ses) *adj.* designating or of a computer memory that allows data to be accessed directly and does not require following a sequence of storage locations

ran·dom·ize (-īz′) *vt.* **-ized′**, **-iz′ing** to select or choose (items of a group) in a random order to obtain an unbiased result, often by using a table of random numbers —**ran′dom·i·za′tion** *n.*

random variable *Statistics* a variable whose values are determined independently according to a probability distribution

random walk *Math.* a sequence of movements in which the direction of each successive move is determined entirely at random

R & R **1** *Mil.* rest and recuperation (leave): also **R and R** **2** rest and relaxation (or recreation) **3** rock-and-roll: also **r & r**

ran·dy (ran′dē) *adj.* [prob. < *rand*, dial. var. of RANT + -Y[2]] **1** [Chiefly Scot.] coarse; crude; vulgar **2** sexually aroused; amorous; lustful —*n., pl.* **-dies** [Scot.] a vulgar, quarrelsome woman; shrew

rang (raŋ) *vi., vt. pt. of* RING[1]

range (rānj) *vt.* **ranged**, **rang′ing** [ME *rangen* < OFr *ranger*, var. of *rengier*, to arrange in a circle, row (> ME *rengen*) < *renc* < Frank **hring*, akin to OE, OHG *hring*, RING[2]] **1** to arrange in a certain order; esp., to set in a row or rows **2** to put into the proper class or classes; systematize **3** to place with others in a cause, party, etc. [*to range oneself with the rebels*] **4** to put (a gun, telescope, etc.) in a line with the target or object, at a proper angle of elevation; train **5** [Now Rare] to make level or even **6** to travel over or through; roam about [*to range the woods*] **7** to travel or move along [*to range the coastline*] ☆**8** to put out (cattle, etc.) to graze on a range **9** to arrange (the anchor cable) in even rows on deck —*vi.* **1** to extend, reach, or lie in a given direction or in a row [*hills ranging toward the south*] **2** to wander about; roam **3** to move about an area, as in hunting [*dogs ranging through the woods*] **4** to have a specified range [*a gun that ranges five miles*] **5** to vary between stated limits [*children ranging in age from 5 to 12*] **6** *Biol.* to be native to a ... OFr *renc*] **1** a row, line, or series

studies] **8** fig. extent of pitch, from highest to lowest tones, o[f] voice, instrument, composition, etc. **9** a wandering or roaming ☆ a large, open area of land over which livestock can wander and gr[aze] **11** the limits of possible variations of amount, degree, etc. [*a w[ide] range of prices*] **12** a unit for cooking typically including an ov[en] and surface heating units usually operated by gas or electricity ☆ in U.S. public surveying, a strip of land between two meridian li[nes] six miles apart, constituting a row of townships **14** *Biol.* the reg[ion] to which a plant or animal is native **15** *Math.* the set of all disti[nct] values that may be taken on by a given function **16** *Statistics* difference between the largest and smallest values in a sample *adj.* of a range, or open grazing place

SYN.—**range** refers to the full extent over which something is perceiva[ble,] effective, etc. [*the range of his knowledge*]; **reach** refers to the furt[hest] limit of effectiveness, influence, etc. [*beyond the reach of my understa[nd]ing*]; **scope** implies considerable room and freedom of range, but wit[hin] prescribed limits [*does it fall within the scope of this dictionary?*]; **co[m]pass** also suggests completeness within limits regarded as a circumfere[nce] [*he did all within the compass of his power*]; **gamut**, in this connecti[on,] refers to the full range of shades, tones, etc. between the limits of so[me]thing [*the full gamut of emotions*]

range finder any of various instruments for determining the dista[nce] of a target or object from an observer, or from a gun, camera, e[tc.:] also **range′find′er** *n.*

Range·ley Lakes (rānj′lē) [after an early owner of the regi[on]] chain of lakes in W Me. & NE N.H.

rang·er (rān′jər) *n.* [ME *raunger*, a forest officer: see RANGE] **1** [a person] who ranges; a wanderer **2** *a)* any of a group of mounted troops patrolling a region ☆*b)* [*often* **R-**] any of a group of soldiers, trai[ned] for raiding and close combat **3** *a)* in England, the chief official [of a] royal park or forest ☆*b)* in the U.S., a warden who patrols gove[rn]ment parks and forests

Ran·goon (ran go͞on′, raŋ-) *old name of* YANGON

rang·y (rān′jē) *adj.* **rang′i·er**, **rang′i·est** **1** able or inclined to ra[nge] about ☆**2** long-limbed and slender [*rangy cattle*] ☆**3** having open range; spacious —**rang′i·ness** *n.*

ra·ni (rä′nē) *n.* [Hindi *rānī* < Sans *rājñī*, fem. of *rājan*: see RAJAH] [in] India, the wife of a rajah or a woman who is a queen or princess [in] her own right: also sp. **ra′nee**

ra·nid (rā′nid, ran′id) *n.* [< ModL *Ranidae* < L *rana*, a frog] any [of a] large family (Ranidae) of frogs having teeth in the upper jaw

rank[1] (raŋk) *n.* [MFr *renc* < OFr *ranc, renc*: see RANGE] **1** a r[ow,] line, or series **2** an orderly arrangement **3** a social division or cl[ass;] stratum of society [*people from all ranks of life*] **4** a high position [in] society; high degree; eminence [*a person of rank*] **5** an official gr[ade] or position [*the rank of captain*] **6** a relative position, usually i[n a] scale classifying persons or things; grade; degree [*a poet of the fi[rst] rank*] **7** any of the rows of squares on a chessboard extending fr[om] side to side, perpendicular to the files **8** *Mil. a)* a row of soldi[ers,] vehicles, etc. placed side by side, or abreast of one another (cf. FI[LE,] *n.* 3) *b)* [*pl.*] the body of soldiers of an army, as distinguished fr[om] the officers [*to rise from the ranks*] **9** *Music* STOP (*n.* 9*a*) —*vt.* **1** [to] place in a rank or ranks **2** to assign a certain rank, or position, ☆**3** to have a higher rank than; outrank —*vi.* **1** to hold a cert[ain] rank, or position [*to rank third on a list*] **2** [Archaic] to form a ra[nk] or move in ranks —☆**pull (one's) rank on** [Slang] to take advant[age] of one's military rank in enforcing commands or one's high posit[ion] or seniority in making demands on (a subordinate) —**rank and** [file] **1** the body of soldiers of an army, as distinguished from the offic[ers] **2** the common people, as distinguished from leaders or officials

rank[2] (raŋk) *adj.* [ME *ranke* < OE *ranc*, strong, proud, akin [to] MLowG *rank*, slender, erect, long and thin < IE base **reĝ-*, put [in] order, stretch out > RIGHT] **1** growing vigorously and coars[ely;] overly luxuriant [*rank grass*] **2** producing or covered with a luxu[ri]ant crop; extremely fertile **3** strong and offensive in smell or ta[ste;] rancid **4** in bad taste; coarse **5** complete; utter [*rank deceit*] [Obs.] in sexual heat —**rank′ly** *adv.* —**rank′ness** *n.*

Ran·ke (räŋ′kə), **Le·o·pold von** (lā′ō pōlt′ fôn) 1795-1886; Ger. his[to]rian

rank·er (raŋ′kər) *n.* [Brit., etc. (exc. Cdn.)] **1** a soldier in the ranks a commissioned officer promoted from the ranks

Ran·kine (raŋ′kin) *adj.* [after Wm. J. M. *Rankine* (1820-72), S[cot.] physicist] designating or of an absolute-temperature scale in wh[ich] a measurement interval equals a Fahrenheit degree and in which [0°] is equal to -459.67°F, so that the freezing point of water is 491.67

Ran·kine-cy·cle engine (-si kəl) [see prec.] a type of steam eng[ine] involving a continuous cycle of vaporization of liquid and conden[sa]tion back to liquid in a sealed system: developed experimentally [for] use in automobiles to reduce polluting emissions, utilize chea[p] fuels, etc.

rank·ing (raŋ′kiŋ) *adj.* ☆**1** of the highest rank [*the ranking offic[er]*] ☆**2** prominent or outstanding [*a ranking composer*] —*n.* **1** the [act] or an instance of listing persons or things in order of importan[ce,] achievement, quality, etc. **2** such a listing

ran·kle (raŋ′kəl) *vi., vt.* **-kled**, **-kling** [ME *ranclen* < OFr *rancle[r]*, *raoncle, draoncle*, a fester, ulcer < ML *dracunculus* < L, dim. [of] *draco*, DRAGON] **1** orig., to fester; become or make inflamed **2** [to] cause or cause to have long-lasting anger, rancor, resentment, [etc.] [*their indifference rankled him*]

ran·sack (ran′sak′) *vt.* [ME *ransaken* < ON *rannsaka* < *rann*, ho[use] (akin to OE *ærn*, Goth *razn* < IE base **(e)re-*, to REST[1]) + *-saka*, *sœkja*, to SEEK] **1** to search thoroughly; examine every part of **2** to search through for plunder; pillage; rob —**ra[n]·sack′er** *n.*

ran·som (ran′səm) *n.* [ME *raunson* < OFr *raençon* < L *redemp[tio],* REDEMPTION] **1** the redeeming or release of a captive or of sei[zed] property by paying money or complying with other demands

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